



## LAB ACTIVITY: RADIATIVE HEATING OF LAND AND WATER

**OBJECTIVE:** Students will:

- ❖ Develop a hypothesis regarding the heating and cooling of land and water;
- ❖ Compare differences in heating and cooling of land and water.

**MATERIALS:**

- ❖ thermometers (2)
- ❖ lamp with heat bulb
- ❖ stopwatch
- ❖ sand/soil
- ❖ beakers (2) water
- ❖ Map of the US

**PRE-LAB DISCUSSION QUESTIONS:**

1. Where does the heat in Earth's troposphere come from?
2. Imagine walking barefoot on a beach on a hot day.
  - a) What would the temperature of the sand be like?
  - b) How would the water feel in comparison to the sand?
  - c) If you returned to the beach after sunset, would the water or the sand feel warmer?
3. Make a prediction: Do you believe that water or dirt will have the greatest change in temperature? Explain.

**PROCEDURE :** ( Post the following steps for the class or on individual sheets.)

1. Fill one beaker up to the 200 mL mark with water, and the other to the 200 mL mark with soil.
2. Place a thermometer in each beaker, about 1 cm below the surface. You may need a clothespin or other clip to secure the thermometer in the beaker with water.

## Teacher Sheet 2

3. Place the beakers 10-15 centimeters below the bulb of the lamp, but don't turn on the lamp yet.
4. Record the starting temperature of each material in your data table at "0 minutes." Turn on the lamp.
5. Record the temperature of each material every 3 minutes until 12 minutes have passed.
6. At the 12 minutes mark, turn off the light and move it away from the beakers.
7. Once the light bulb is turned off, continue recording the temperature of the water and soil every 3 minutes for another 12 minutes.
8. Plot your data on a line graph:
  - ✓ Label the X-axis: Time (minutes)
  - ✓ Label the Y-axis: Temperature °C
  - ✓ Connect the points for the two sets of data, and label and color one for water and the other for land.
  - ✓ Use two different colors to plot the data, one color for all water data points, and a different color for all soil data points. You should have a total of 9 data points for each material.
9. Connect the points for each line. Label the lines appropriately with "water" and "soil".
10. Answer the questions in the **ANALYSIS** section.

### LAB SET-UP



